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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/899,650

07/05/2001

Byoung-Seung Ham

51876P264

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09/08/2004

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EXAMINER

PHAN, HANH

ART UNIT

PAPER NUMBER

2633

DATE MAILED: 09/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/899,650

Applicant(s)

HAM, BYOUNG-SEUNG

Examiner

Hanh Phan

Art Unit

2633

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 05 July 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>09/03/2004</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Double Patenting*

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. Claims 1-20 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-20 of U.S. Patent No. 6,628,453 (Ham). Although the conflicting claims are not identical, they are not patentably distinct from each other because the limitations recited in claims 1-20 of the instant application are encompassed by claims 1-20 of U.S. Patent No. 6,628,453 (Ham).

Regarding claims 1, 6, 11 and 16, Ham (U.S. Patent No. 6,628,453) discloses a method of for quantum modulating optical signals by using a nonlinear optical medium, wherein the nonlinear optical medium includes two closely spaced ground states  $|1\rangle$  and  $|2\rangle$  such that the transition among the ground states is dipole forbidden, and an

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excited  $|3\rangle$  such that two-photon transition between the ground states  $|1\rangle$  and  $|2\rangle$  via the excited state  $|3\rangle$  is allowed, the method comprising the steps of:

applying a first continuous wave (cw) laser light as an input to the nonlinear optical medium through an optical fiber or free space at a frequency of  $\omega_\alpha$  corresponding to a first transition between the ground state  $|1\rangle$  and the excited state  $|3\rangle$ ;

applying a second laser light to the nonlinear optical medium through an optical fiber or free space at a frequency of  $\omega_\beta$  corresponding to a second transition between the ground state  $|2\rangle$  and the excited state  $|3\rangle$ ;

adjusting the intensities of the first laser light  $\omega_\alpha$  and the second laser beam  $\omega_\beta$  to produce a strongly driven superposition state composed of the ground state  $|1\rangle$  and the  $|2\rangle$  creating two-photon coherence induction  $\text{Rep}_{12}$ ;

applying a third laser light to the nonlinear optical medium through an optical fiber or free space at a frequency of  $\omega_p$  corresponding to a third transition between the ground state  $|2\rangle$  and the excited state  $|3\rangle$  for nondegenerate four-wave mixing or phase conjugation geometry with the first laser light  $\omega_\alpha$ , the second laser light  $\omega_\beta$ , and the third laser light  $\omega_p$  to produce nondegenerate four-wave mixing signal  $\omega_d$ ; and

connecting the nondegenerate four-wave mixing signals  $\omega_d$  to an optical fiber (see claims 1 and 12 of U.S. Patent No. 6,628,453).

Regarding claims 2 and 7, Ham (U.S. Patent No. 6,628,453) discloses the excited state  $|3\rangle$  is selected such that its energy level is higher than the energy level of the ground state  $|1\rangle$  and the  $|2\rangle$  (see claim 2 of U.S. Patent No. 6,628,453).

Regarding claims 3 and 8, Ham (U.S. Patent No. 6,628,453) discloses the ground state  $|2\rangle$  is selected such that its energy level is higher than the energy level of the ground state  $|1\rangle$  (see claim 3 of U.S. Patent No. 6,628,453).

Regarding claims 4, 5, 9 and 10, Ham (U.S. Patent No. 6,628,453) discloses the second laser light  $\omega_\beta$  and the third laser light  $\omega_p$  are synchronized to satisfy a temporal and spatial overlap of the laser lights  $\omega_\alpha$ ,  $\omega_\beta$ , and  $\omega_p$  in the nonlinear optical medium, and frequency difference  $\delta_p$  between the second laser light  $\omega_\beta$  and the third laser light  $\omega_p$  is near the Rabi frequency  $\Omega_p$  of the  $\omega_p$  (see claims 4 and 5 of U.S. Patent No. 6,628,453).

Regarding claims 12, 13, 17 and 18, Ham (U.S. Patent No. 6,628,453) discloses the nonlinear optical medium is a solid (see claims 13 and 14 of U.S. Patent No. 6,628,453).

Regarding claims 14 and 19, Ham (U.S. Patent No. 6,628,453) discloses the two ground states  $|1\rangle$  and  $|2\rangle$ , and the excited state  $|3\rangle$  are selected in conduction band of the doubly coupled semiconductor quantum wells (see claim 15 of U.S. Patent No. 6,628,453).

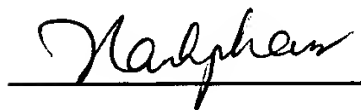
Regarding claims 15 and 20, Ham (U.S. Patent No. 6,628,453) discloses the first laser light source delivers single-mode light (see claim 16 of U.S. Patent No. 6,628,453).

***Conclusion***

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hanh Phan whose telephone number is (571)272-3035.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan, can be reached on (571)272-3022. The fax phone number for the organization where this application or proceeding is assigned is (703)872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-4700.

A handwritten signature in cursive script, appearing to read 'Hanh Phan', is written over a horizontal line.

Hanh Phan

09/03/2004